

Next-Generation Ion Thruster Design Tool to Support Future Space Missions, Phase II

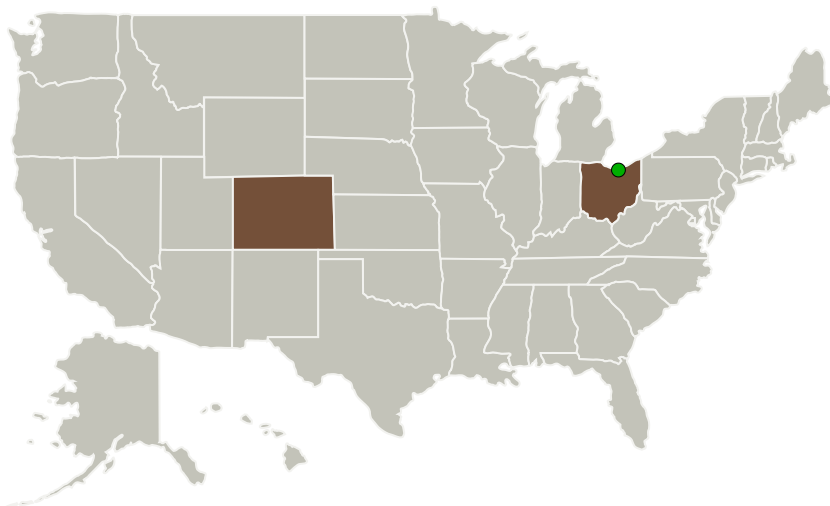
Completed Technology Project (2011 - 2014)



Project Introduction

Computational tools that accurately predict the performance of electric propulsion devices are highly desirable and beneficial to NASA and the broader electric propulsion community. The current state-of-the-art in electric propulsion modeling relies heavily on empirical data and on numerous computational "knobs". In Phase I of this project, we developed the most detailed ion engine discharge chamber model that currently exists. This is a kinetic model that simulates all particles in the discharge chamber along with a physically correct simulation of the electric fields. In addition, kinetic erosion models are included for modeling the ion-impingement effects on thruster component erosion. For Phase II of this project, the goal is to make this sophisticated computer program a user friendly program that NASA and other governmental and industrial customers are able to utilize. In Phase II we will implement a number of advanced numerical routines to bring the computational time down to a commercially acceptable level. At the end of Phase II, NASA will have a highly sophisticated, user friendly ion engine discharge chamber modeling tool that will save time and expense in designing new and different size ion engines, as well as analyzing existing ion engine performance.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Tech-X Corporation	Lead Organization	Industry	Boulder, Colorado
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
Wright State University-Main Campus	Supporting Organization	Academia	Dayton, Ohio

Primary U.S. Work Locations

Colorado	Ohio
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Project Transitions

▶ **July 2011:** Project Start

✓ **August 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139165>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tech-X Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

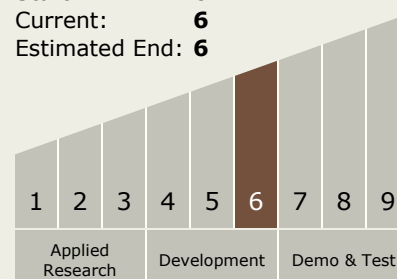
Carlos Torrez

Principal Investigator:

Sudhakar Mahalingam

Technology Maturity (TRL)

Start: 6
Current: 6
Estimated End: 6



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Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.2 Electric Space Propulsion
 - └ TX01.2.2 Electrostatic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System